

【特許請求の範囲】

【請求項1】 データが書き込まれる画素トランジスタを有し、X-Y方向に延びている画像表示部と、上記画素トランジスタをオンオフして、上記画像表示部にデータを書き込むドライバ部とが、絶縁性基板上に一体的に形成されている薄膜トランジスタ基板と、上記薄膜トランジスタ基板に対向して配置された対向基板と、上記薄膜トランジスタ基板と対向基板の間に挿入された液晶層とで構成される液晶表示装置において、
上記ドライバ部は、
上記画像表示部の画素トランジスタに、X方向に沿ってデータを書き込むソースドライバと、
Y方向に沿って形成された上記画素トランジスタをオンオフさせるゲートドライバとを備え、
上記ソースドライバは、少なくとも2系統以上の異なる入力信号が入力される2つ以上の駆動回路で構成されていることを特徴とする液晶表示装置。

【請求項2】 請求項1に記載の液晶表示装置において、
上記ドライバ部のソースドライバは、
上記画像表示部のX方向に延びている上辺と下辺に沿って配置されていることを特徴とする液晶表示装置。

【請求項3】 請求項1または2に記載の液晶表示装置において、
上記ドライバ部が備えるドライバのうちの少なくとも1つが、デジタルドライバで構成されていることを特徴とする液晶表示装置。

【請求項4】 請求項1乃至3のいずれか1つに記載の液晶表示装置において、
上記ソースドライバは入力信号を上記画像表示部に書き込む信号処理回路を有し、上記ゲートドライバは2つ以上のドライバ信号から所定のドライバ信号を選択して上記画像表示部に入力する切替スイッチを備えていることを特徴とする液晶表示装置。

【請求項5】 請求項1に記載の液晶表示装置において、
上記画像表示部にデータを書き込むための信号線は、上記画像表示部内において分割されていることを特徴とする液晶表示装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、アクティブマトリックス型の液晶表示装置に関し、特に、ポリシリコンを用いたドライバモノリシック型液晶表示装置に関する。より詳しくは、1つの画面上に複数の画像表示を行うマルチ画面表示において、信号入力を容易にするドライバ構成を備えた液晶表示装置に関する。

【0002】

【従来の技術】近年、ガラス基板上に形成された薄膜トランジスタで、マトリックス状に配列された画素電極を

スイッチングすることで、液晶を駆動して表示させるアクティブマトリックス方式の液晶表示装置が実用化され、ディスプレイの1つの分野を形成している。

【0003】現状では、薄膜トランジスタの材料の主流は非晶質シリコンであり、この材料の持つ能力によって、薄膜トランジスタの駆動電流が制限され、トランジスタの適応範囲が画素トランジスタに限定されていた。

【0004】一方、近年、CRT表示装置に代表されるテレビジョン受像機は、単に、放送映像信号を表示させるだけではなく、いろいろな情報サービスを表示する機能が求められている。例えば、通常の放送電波の間に文字情報を入れ込む機能や、専用回線によるインターネットサービスなどが要望されている。

【0005】従来、これらの信号を処理する場合、受信信号をラインメモリあるいはフレームメモリに蓄積して、異なる画像情報を1つのフレームに再構成した後、画像信号として、表示部への書き込みを行う方法が取られている。この方法では、大容量のメモリ及びA/D変換回路やD/A変換回路等が必要になる。

【0006】また、アモルファスシリコンを用いた従来の液晶表示装置では、回路をLSIブロック毎に分割して、各LSIブロックを別駆動することが可能であるが、このブロック毎に、別種類のLSIを実装する必要があるので、製造上のプロセスが複雑になる等の問題があった。

【0007】

【発明が解決しようとする課題】そこで、この発明の目的は、複数の画像を同時表示する場合の周辺回路の複雑さを解消でき、特殊な変換回路やメモリー等を必要としない構造を持つ画像表示装置を提供することにある。

【0008】

【課題を解決するための手段】前述の電流駆動能力の低い非晶質シリコンに替えて、一部結晶性を有する多結晶シリコンを材料とする薄膜トランジスタが開発されている。この多結晶シリコンは、非晶質シリコンよりも2桁以上駆動能力が高いトランジスタを構成できる。

【0009】そこで、本発明者らは、この多結晶シリコンは、画素のスイッチング回路だけでなく、画素を駆動する駆動回路(ゲートドライバ、ソースドライバ)にも用いることができることに着目した。すなわち、本発明のポイントは、多結晶シリコンで構成された薄膜トランジスタを用いた場合、ドライバを画素と同基板上に形成することが可能になり、画素と駆動回路の接続が必要でなくなり電源、入力信号、タイミング信号などのための数本の信号線を接続するだけで動作が可能になることにある。

【0010】したがって、請求項1の発明の液晶表示装置は、データが書き込まれる画素トランジスタを有し、X-Y方向に延びている画像表示部と、上記画素トランジスタをオンオフして、上記画像表示部にデータを書き

込むドライバ部とが、絶縁性基板上に一体的に形成されている薄膜トランジスタ基板と、上記薄膜トランジスタ基板に対向して配置された対向基板と、上記薄膜トランジスタ基板と対向基板の間に挿入された液晶層とで構成される液晶表示装置において、上記ドライバ部は、上記画像表示部の画素トランジスタに、X方向に沿ってデータを書き込むソースドライバと、Y方向に沿って形成された上記画素トランジスタをオンオフさせるゲートドライバとを備え、上記ソースドライバは、少なくとも2系統以上の異なる入力信号が入力される2つ以上の駆動回路で構成されていることを特徴としている。

【0011】この請求項1の発明では、画像表示部とドライバ部とが絶縁性基板上に一体的に形成されているドライバーモノリシック構造であって、上記ドライバ部のソースドライバが備える2つ以上の駆動回路に、2系統以上の独立した入力信号(映像信号、文字情報、インターネットによるデジタル入力信号など)を入力できる。したがって、この発明によれば、複数の画像を同時表示する場合の周辺回路の複雑さを解消でき、特殊な変換回路やメモリー等を必要としない構造を持つ画像表示装置を実現できる。

【0012】具体的には、例えば、図1に示すように、駆動回路を一体に形成する所謂ドライバーモノリシックパネルを用い、画面表示部の上下に各々独立したソース回路を設け、独立して駆動することにより画面分割を容易に行うことができる。これは画面の上下にドライバを配することに限定されるわけではなく、一本のソースライン内においても、ドライバの一部を分割し別入力にすることも可能である。

【0013】また、近年のデジタル化に対応した表示として、ドライバ回路の少なくとも一つがデジタル回路で構成される。このことにより、従来のアナログ信号に対応した映像表示と文字放送およびインターネット等のデジタル入力に対応した同時に2つ以上の信号の表示が可能になる。さらに、文字表示部をあらかじめ指定された領域に構成する場合、固定領域の解像度を変えて独立操作することも可能となる。このように、ドライバモノリシック回路を用いることによって、同一基板上に独立して駆動可能な回路を複数搭載することが可能となる。

【0014】また、請求項2の発明は、請求項1に記載の液晶表示装置において、上記ドライバ部のソースドライバは、上記画像表示部のX方向に延びている上辺と下辺に沿って配置されていることを特徴としている。

【0015】この請求項2の発明では、画像表示部の上下に各々独立したソースドライバの駆動回路が配置されているので、この複数の駆動回路をそれぞれ独立して駆動することによって、画面分割を容易に行うことができる。

【0016】また、請求項3の発明は、請求項1または2に記載の液晶表示装置において、上記ドライバ部が備

えるドライバのうちの少なくとも1つが、デジタルドライバで構成されていることを特徴としている。

【0017】この請求項3の発明では、ドライバの少なくとも1つをデジタル回路で構成することによって、従来のアナログ信号に対応した映像表示と文字放送、インターネット等のデジタル入力に対応した同時複数画像表示ができる。

【0018】また、請求項4の発明は、請求項1乃至3のいずれか1つに記載の液晶表示装置において、上記ソースドライバは入力信号を上記画像表示部に書き込む信号処理回路を有し、上記ゲートドライバは2つ以上のドライバ信号から所定のドライバ信号を選択して上記画像表示部に入力する切替スイッチを備えていることを特徴としている。

【0019】この請求項4の発明では、上記切替スイッチで、2つ以上のドライバ信号から所定のドライバ信号を選択して上記画像表示部に入力し、上記ソースドライバが備える2つ以上の駆動回路から2系統以上の異なる入力信号を順次、画像表示部に入力することができる。

【0020】また、請求項5の発明は、請求項1に記載の液晶表示装置において、上記画像表示部にデータを書き込むための信号線は、上記画像表示部内において分割されていることを特徴としている。

【0021】この請求項5の発明では、分割された信号線に対応する分割された複数の画像表示部分の解像度を用途に応じて別個に設定できる。

【0022】

【発明の実施の形態】以下、この発明の液晶表示装置を図示の実施の形態に基づいて詳細に説明する。

【0023】図1に、この発明の液晶表示装置の実施の形態の回路構成を示す。この実施の形態の回路構成では、ドライバモノリシック回路を実現するために、多結晶シリコンを用いたドライバモノリシック型液晶表示装置を実現している。多結晶シリコンTFT(薄膜トランジスタ)は、ドライブ能力が大きく、高速で駆動する回路に適している。また、高精細度のパネルを作製することもでき、本発明の用途としては最適である。本発明の適用対象となる表示装置は、主に、8インチから40インチの大型表示装置であり、8インチクラスの中型の表示装置については直視パネルとして構成可能である。また、20インチ以上のパネルについては投影型の表示装置を用いてもよい。

【0024】この液晶表示装置は、画像表示部1と、Y方向に延在するように配置されたゲートドライバ3と、X方向に延在するように配置された1対のソースドライバ40、50を備えている。このソースドライバ40は、画像表示部1の上辺に沿って配置されており、シフトレジスタ41と信号処理回路42からなる。また、ソースドライバ50は、画像表示部1の下辺に沿って配置されており、シフトレジスタ51と信号処理回路52からなる。

らなる。このシフトレジスタ41と51は、入力信号を順次画素に送るものである。また、信号処理回路42、52は、バッファやサンプルホールド回路で構成されている。

【0025】上記画像表示部1は、X-Y方向に配列された複数の画素TFT2、2、2…を備え、各画素TFT2のゲートは上記ゲートドライバ3に接続されている。また、各画素TFT2のソースは上記ソースドライバ40および50に接続されている。

【0026】図2に示すように、テレビジョン信号に代表されるアナログ映像信号200がビデオ処理回路としてのアナログ信号処理回路210に入力され、このアナログ信号処理回路210で復調、増幅されてから、RGB表示信号として、ソースドライバ40に入力される。また、このアナログ信号処理回路210は、上記RGB表示信号と同期して、ゲートドライバ駆動信号220をゲートドライバ3に入力する。

【0027】一方、パーソナルコンピュータ等で扱う情報信号が代表するデジタル信号201は、デジタル信号処理回路211を通してソースドライバ50にデータ信号として入力される。ここで、ソースドライバ50はデジタル回路で構成されているので、上記デジタル信号201をそのまま映像信号として画像表示部1に表示させることができる。

【0028】この実施の形態では、画像表示部1とドライバ部をなすドライバ3、40、50が絶縁性基板(図示せず)上に一体的に形成されているドライバモノリシック構造となっている。そして、上記ソースドライバ40、50が備える2つの処理回路42、52に、アナログ映像信号200とデジタル映像信号201の2系統の独立した入力信号(例えば、映像信号、文字情報、インターネットによるデジタル入力信号など)を入力できる。したがって、この実施形態によれば、複数の画像を同時表示する場合の周辺回路の複雑さを解消でき、特殊な変換回路やメモリ等を必要としない構造を持つ画像表示装置を実現できる。

【0029】また、この実施の形態では、画像表示部1の上下に各々独立したソースドライバ40、50が配置されているので、この2つの独立したソースドライバ40、50をそれぞれ独立して駆動することによって、容易に画面分割できる。

【0030】ところで、画像表示部1の表示エリアをあらかじめ決めない場合には、ゲートドライバ3は、アナログ映像信号200とデジタル信号201を順次、画像表示部1に入力する方法をとるよう動作する。この方法では、あらかじめ、アナログ信号処理回路210が、ラインメモリを用いて信号を圧縮し、書き込み時間を短縮し、ブランキングの時間を用いてデジタル信号201を画像表示部1に書き込むことができる。

【0031】また、画像表示部1の表示エリア内で、映

像信号200が入力される部分とデジタル信号201が入力される部分とを分割することがあらかじめ決まっている場合には、映像信号入力部分1Aとデジタル信号入力部分1Bとを、ソースドライバ40と50で独立して駆動できる。さらにこの場合、図2に示すように、ソースライン233、233…を、映像信号入力部分1A側のライン233A、233A…とデジタル信号入力部分1B側のライン233B、233B…とに分割した構成にできる。この場合には、入力部分1Aと1Bとで、分解能や画素ピッチを替えることができる。すなわち、高い分解能を必要とする文字表示部(例えば、入力部分1B)では、映像表示部(入力部分1A)に比べて、画素数を増やすことができる。このことは、この実施形態のように、ドライバモノリシック型パネルにおいては、容易に実現することができる。

【0032】次に、上記実施形態の変形例として、表示画面を画面300、301、302、303に4分割し、この4画面を独立して駆動し表示させる一例を示す。この変形例では、ゲートドライバ310、311、312、313とソースドライバ340、341、342、343との組み合わせにより、各表示画面300、301、302、303を独立して走査し表示させることができる。このソースドライバ340、341、342、343は、それぞれ、シフトレジスタ340a、341a、342a、343aおよび信号処理回路340b、341b、342b、343bからなる。

【0033】上記ゲートドライバ310と311はX方向に対向しており、ゲートドライバ312と313はX方向に対向している。また、ゲートドライバ310と312はY方向に並んでおり、ゲートドライバ311と313はY方向に並んでいる。一方、ソースドライバ340とソースドライバ341はX方向に並んでおり、ソースドライバ342と343はX方向に並んでいる。

【0034】この変形例では、表示画面300は、ソースドライバ340とゲートドライバ310とで走査されて表示をする。また、表示画面301は、ソースドライバ341とゲートドライバ311とで走査されて表示をする。また、表示画面302は、ソースドライバ342とゲートドライバ312とで走査されて表示し、表示画面303は、ソースドライバ343とゲートドライバ313とで走査されて表示する。

【0035】この変形例のように、画面を分割して独立走査する場合には、ドライバモノリシックである利点を生かして、文字表示画面302を映像情報表示画面300よりも高解像度にすることによって、文字を鮮明に表示できる。特に、画素ピッチに合わせたドライバ接続がガラス基板上で可能となり、実装上の制限を受けることなく、解像度の異なる複数の画面を独立して駆動し表示することができる。

【0036】尚、上記実施の形態では、画面の上辺と下

辺に沿ってソースドライバを配置したが、一本のソースライン内において、ソースドライバの一部を分割し、別系統の信号を入力することも可能である。

【0037】

【発明の効果】以上より明らかなように、請求項1の発明の液晶表示装置は、画像表示部とドライバ部とが絶縁性基板上に一体的に形成されているドライバモノリシック構造であって、上記ドライバ部のソースドライバが備える2つ以上の駆動回路に、2系統以上の独立した入力信号(映像信号、文字情報、インターネットによるデジタル入力信号など)を入力できる。したがって、この発明によれば、複数の画像を同時表示する場合の周辺回路の複雑さを解消でき、特殊な変換回路やメモリー等を必要としない構造を持つ画像表示装置を実現できる。

【0038】また、請求項2の発明は、画像表示部の上下に各々独立したソースドライバの駆動回路が配置されているので、この複数の駆動回路をそれぞれ独立して駆動することによって、画面分割を容易に行うことができる。

【0039】また、請求項3の発明は、請求項1または2に記載の液晶表示装置において、ドライバの少なくとも1つをデジタル回路で構成することによって、従来のアナログ信号に対応した映像表示と文字放送、インターネット等のデジタル入力に対応した同時複数画像表示ができる。

【0040】また、請求項4の発明は、請求項1乃至3のいずれか1つに記載の液晶表示装置において、上記ソースドライバは入力信号を上記画像表示部に書き込む信号処理回路を有し、上記ゲートドライバは2つ以上のドライバ信号から所定のドライバ信号を選択して上記画像表示部に入力する切替スイッチを備えている。

【0041】この請求項4の発明では、上記切替スイッチで、2つ以上のドライバ信号から所定のドライバ信号

を選択して上記画像表示部に入力し、上記ソースドライバが備える2つ以上の駆動回路から2系統以上の異なる入力信号を順次、画像表示部に入力することができる。

【0042】また、請求項5の発明は、請求項1に記載の液晶表示装置において、画像表示部にデータを書き込むための信号線が画像表示部内において分割されている。この発明では、分割された信号線に対応する分割された複数の画像表示部分の解像度を用途に応じて別個に設定できる。

【0043】以上のように、本発明を用いることにより、入力信号をA/D変換またはD/A変換することなしに、表示部に入力することができるから、並列に信号入力することが可能となり、周辺回路の簡略化を図ることができる。また、本発明のドライバモノリシックパネルを用いることによって、画面分割および解像度の異なる表示を実装の負担なく実現できる。

【図面の簡単な説明】

【図1】 この発明の液晶表示装置の実施形態の画像表示部およびその周辺に配置された各ドライバを示す構成図である。

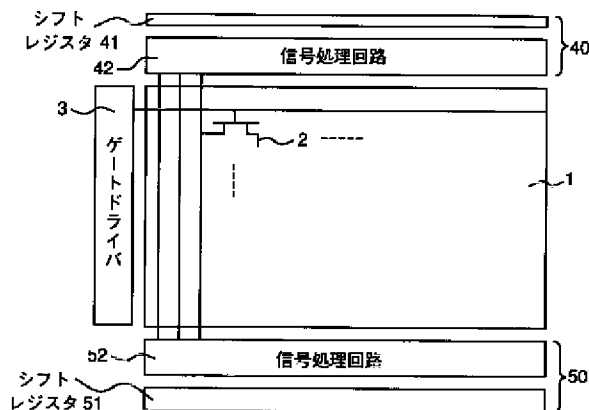
【図2】 上記実施形態における入力信号の流れを示す図である。

【図3】 上記実施形態の変形例を示す構成図である。

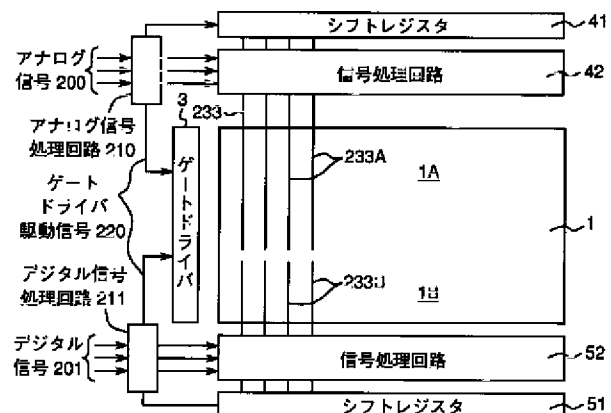
【符号の説明】

1…液晶表示部、2…画素TFT、3…ゲートドライバ、40、50…ソースドライバ、41、51…シフトレジスタ、42、52…信号処理回路、200…アナログ映像信号、210…アナログ信号処理回路、220…ゲートドライバ駆動信号、201…デジタル信号、211…デジタル信号処理回路、233…ソースライン、300、301、302、303…画面、310、311、312、313…ゲートドライバ、340、341、342、343…ソースドライバ。

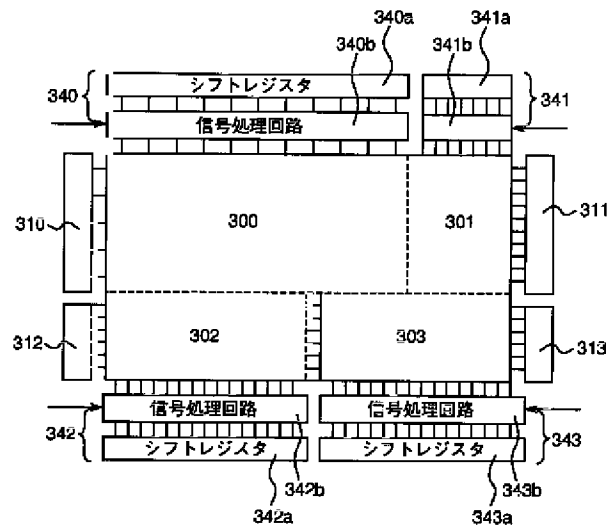
【図1】



【図2】



【図3】



フロントページの続き

F ターム(参考) 2H093 NA16 NA22 NA43 NA53 NC22
 NC23 NC34 ND49
 5C006 AA01 AA22 AB01 AF27 AF47
 AF73 BB14 BB16 BC12 BC20
 BF03 BF05 BF11 EC11 FA04
 FA05 FA06 FA41 FA51
 5C080 AA10 BB05 BB08 DD21 DD22
 DD27 EE32 FF11 FF13 JJ02
 5C094 AA13 AA45 AA48 AA51 AA52
 AA56 BA03 BA43 CA19 DA09
 DB01 DB04 EA04 EA07 EA10
 FA01 GA10

Japanese Unexamined Patent Publication
No. 187470/2000 (*Tokukai* 2000-187470)

A. Relevance of the Above-identified Document

The following is a partial English translation of exemplary portions of non-English language information that may be relevant to the issue of patentability of the claims of the present application.

B. Translation of the Relevant Passages of the Document

See also the attached English Abstract.

[0008]

[MEANS TO SOLVE THE PROBLEMS]

There have been a development of a thin film transistor made of polycrystalline silicon having partially crystalline characteristics, instead of the amorphous silicon whose current drive capability is low. This polycrystalline silicon allows realization of a transistor whose drive capability is higher than a transistor made of amorphous silicon by two or more orders of magnitude.

[0009] In view of that, the inventors focused their attentions to a possibility that this polycrystalline silicon is usable not only as a pixel switching circuit, but also as a drive circuit (gate driver, source driver) for driving a pixel. More specifically, use of a thin film transistor made of the polycrystalline silicon allows (i) a driver and a pixel

to be formed on a single substrate, thus eliminating the need for connection between the pixel and the driver and (ii) an operation simply by connecting several signal lines for a power supply, an input signal, a timing signal, or the like. This is the point of the present invention.

[0010] Thus, a liquid crystal display device of the present invention described in reference to claim 1 is a liquid crystal display device including: (A) a thin film transistor having an insulative substrate in which an image displaying section and a driver section are integrally formed, the image displaying section being extended in X-Y directions, and including pixel transistors to which data is written in, the driver section being for writing in the data in the image displaying section by switching on and off the pixel transistors; (B) an opposing substrate arranged so as to face the thin film transistor substrate; and (C) a liquid crystal layer interposed between the thin film transistor substrate and the opposing substrate, wherein: the driver section includes (I) source drivers for writing data to the pixel transistors of the image displaying section along the X-direction, the source drivers configured by at least two drive circuits for receiving input signals of at least two different sources, and (II) gate drivers for switching on and off the pixel transistors in the Y-direction.

[0011] The invention described in reference to claim

1 adopts a driver monolithic structure in which the image displaying section and the driver section are integrally formed on the insulative substrate. The source drivers of the driving section is configured by at least two drive circuits. To these drive circuits, the input signals (video signal, character information, digital input signal received via the internet, or the like) of at least two systems, each of which signals are independent from each other, can be input. This invention solves the problem of complication in peripheral circuits, which problem occurs in a case of simultaneously displaying plural images is avoided, and thus allows realization of an image displaying device having a structure which requires no special converting circuit, memory, or the like.

[0012] Specifically, for example, so-called driver monolithic panel in which driver circuits are integrally formed is used, and upper and lower portions of a screen displaying section are respectively provided with source circuits which are independent from each other, and which are individually driven (See Fig. 1). This allows division of the screen easily. The arrangement of the drivers are not limited to the upper and lower portions of the screen. For example, it is possible to divide a part of a driver so that signals are separately input to a single source line.

[0013] Further, in response to the digitalization

taking place in recent years, at least one of the driver circuits is made of a digital circuit. This realizes a structure which is capable of performing displaying based on two or more signals: i.e., video displaying corresponding to conventional analog signals; and a digital input such as text broadcasting or the internet. Further, in a case where a text displaying region is formed in a previously designated region, the resolution of the fixed region can be varied independently. As described, the use of the driver monolithic circuit allows a single substrate to have thereon a plurality of independently drivable circuits.

[0014] Further, the present invention described in reference to claim 2 is the liquid crystal display device of claim 1 which is adapted so that the source drivers of the driving section are arranged along the upper and lower edges of the image displaying section, which edges are extended in the X-direction.

[0015] In the invention described in reference to claim 2, drive circuits of the source drivers, which circuits are independent from each other, are arranged in the upper and lower portions of the image displaying section. By independently driving these drive circuits, the screen can be easily divided.

[0016] Further, the present invention described in reference to claim 3 is the liquid crystal display device of

claim 1 or 2 which is adapted so that at least one of the drivers in the driving section is configured by a digital driver.

[0017] In the invention of claim 3, at least one of the drivers is made of a digital circuit. This realizes a structure which is capable of performing simultaneous displaying of plural images based on two or more signals: i.e., video displaying corresponding to conventional analog signals; and a digital input such as text broadcasting or the internet.

[0018] Further, the present invention described in reference to claim 4 is the liquid crystal display device of any one of claims 1 to 3 which is adapted so that the source drivers have a signal processing circuit for writing an input signal to the image displaying section, and the gate driver is provided with a switch for inputting, to the image displaying section, a predetermined driver signal selected from two or more driver signals.

[0019] In the invention of claim 4, the switch is used for selecting the predetermined driver signal from two or more driver signals, and inputs the selected driver signal to the image displaying section. Thus, the input signals of at least two different systems are successively input from two or more drive circuits in the source drivers to the image displaying section.

[0021] Further, the present invention described in

reference to claim 5 is the liquid crystal display device of claim 1 which is adapted so that a signal line via which data is written in the image displaying section is divided within the image displaying section.

[0021] With the invention of claim 5, the respective resolutions of divided image displaying sections corresponding to the divided signal lines are individually set depending on the purpose of use.

PATENT ABSTRACTS OF JAPAN

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G02F 1/133

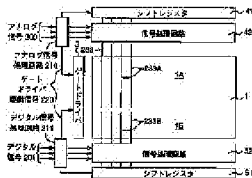
G09F 9/35

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(21)Application number : 10-364733 (71)Applicant : SHARP CORP

(22)Date of filing : 22.12.1998 (72)Inventor : ITO MASATAKA

(54) LIQUID CRYSTAL DISPLAY DEVICE



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a picture display device which is capable of eliminating complexity of peripheral circuits in displaying plural pictures at the same time, and has a structure eliminating the need for special

conversion circuits, memories, etc.

SOLUTION: This picture display device has a driver monolithic structure in which drivers 3, 40, 50 constituting a picture display part 1 and a driver part are formed on an insulating substrate (unshown in the figure) in one body. And, it is possible to input an analog video signal 200 and a digital signal 201 as two independent system input signals (for example, a video signal, a character information, digital input signal through Internet, etc.), to two processing circuits 42, 52 provided on a source drivers.

LEGAL STATUS

[Date of request for examination] 27.07.2001

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- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The image display section which had the pixel transistor in which data are written and has been prolonged in the direction of X-Y, The thin film transistor substrate with which the driver section which turns the above-mentioned pixel transistor on and off, and writes data in the above-mentioned image display section is formed in one on the insulating substrate, In the liquid crystal display which consists of liquid crystal layers inserted between the opposite substrate which countered the above-mentioned thin film transistor substrate, and has been arranged, and the above-mentioned thin film transistor substrate and an opposite substrate The source driver by which the above-mentioned driver section writes data in the pixel transistor of the above-mentioned image display section along the direction of X, It is the liquid crystal display which is equipped with the gate driver made to turn on and off the above-mentioned pixel transistor formed along the direction of Y, and is characterized by the above-mentioned source driver consisting of two or more drive circuits where at least two or more different input signals are inputted.

[Claim 2] It is the liquid crystal display characterized by being arranged along the surface and the lower side where the source driver of the above-mentioned driver section is prolonged in the direction of X of the above-mentioned image display section in the liquid crystal display according to claim 1.

[Claim 3] The liquid crystal display with which at least one of the drivers with which the above-mentioned driver section is equipped is characterized by consisting of digital drivers in a liquid crystal display according to claim 1 or 2.

[Claim 4] It is the liquid crystal display characterized by having the circuit changing switch which it has the digital disposal circuit by which the above-mentioned source driver writes an input signal in the above-mentioned image display section in claim 1 thru/or the liquid crystal display of any one publication of three, and the above-mentioned gate driver chooses a predetermined driver signal from two or more driver signals, and is inputted into the above-mentioned image display section.

[Claim 5] The signal line for writing data in the above-mentioned image display section in a liquid crystal display according to claim 1 is a liquid crystal display characterized by being divided in the above-mentioned image display circles.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the driver monolithic mold liquid crystal display using polish recon about the liquid crystal display of an active-matrix mold. In the multi-picture features which perform two or more image display on one screen in more detail, it is related with the liquid crystal display

equipped with the driver configuration which makes a signal input easy.

[0002]

[Description of the Prior Art] In recent years, by the thin film transistor formed on the glass substrate, the liquid crystal display of the active-matrix method on which liquid crystal is driven and displayed by switching the pixel electrode arranged in the shape of a matrix is put in practical use, and one field of a display is formed.

[0003] In the present condition, the mainstream of the ingredient of a thin film transistor was amorphous silicon, the drive current of a thin film transistor was restricted and the adaptation range of a transistor was limited to the pixel transistor by the capacity which this ingredient has.

[0004] On the other hand, the television receiver represented by the CRT display not only displays a broadcast video signal, but the function which displays various data utility is called for in recent years. For example, the function to put in text between the usual broadcasting electric-waves, the Internet service by the dedicated line, etc. are demanded.

[0005] When processing these signals conventionally, after accumulating an input signal in the frame memory or a frame memory and reconfiguring different image information on one frame, the method of performing the writing to a display is taken as a picture signal. By this approach, mass memory and a mass A/D-conversion circuit, a D/A conversion circuit, etc. are needed.

[0006] Moreover, in the conventional liquid crystal display using an amorphous silicon, although it was possible to have divided a circuit for every LSI block and to have another driven each LSI block, since LSI of another kind needed to be mounted for this the block of every, there were problems, like the process on manufacture becomes complicated.

[0007]

[Problem(s) to be Solved by the Invention] Then, the purpose of this invention can cancel the complexity of the circumference circuit in the case of indicating two or more images by coincidence, and is to offer an image display device with

the structure which does not need a special conversion circuit, memory, etc.

[0008]

[Means for Solving the Problem] It changes to the low amorphous silicon of the above-mentioned current drive capacity, and the thin film transistor made from the polycrystalline silicon which has crystallinity in part is developed. This polycrystalline silicon can constitute a transistor with double or more high figures drive capacity from amorphous silicon.

[0009] Then, this invention persons noted being able to use this polycrystalline silicon not only for the switching circuit of a pixel but for the drive circuit (a gate driver, source driver) which drives a pixel. That is, when the thin film transistor which consisted of polycrystalline silicon is used, it becomes possible to form a driver on a pixel and this substrate, and the point of this invention has less necessary connection of a pixel and a drive circuit, and is for actuation to become possible only by connecting several signal lines for a power source, an input signal, a timing signal, etc.

[0010] Therefore, the liquid crystal display of invention of claim 1 The image display section which had the pixel transistor in which data are written and has been prolonged in the direction of X-Y, The thin film transistor substrate with which the driver section which turns the above-mentioned pixel transistor on and off, and writes data in the above-mentioned image display section is formed in one on the insulating substrate, In the liquid crystal display which consists of liquid crystal layers inserted between the opposite substrate which countered the above-mentioned thin film transistor substrate, and has been arranged, and the above-mentioned thin film transistor substrate and an opposite substrate The source driver by which the above-mentioned driver section writes data in the pixel transistor of the above-mentioned image display section along the direction of X, It has the gate driver made to turn on and off the above-mentioned pixel transistor formed along the direction of Y, and the above-mentioned source driver is characterized by consisting of two or more drive circuits where at least two or more different input signals are inputted.

[0011] In invention of this claim 1, the image display section and the driver section are the driver monolithic structures currently formed in one on the insulating substrate, and two or more independent input signals (digital input signal by the video signal, text, and the Internet etc.) can be inputted into two or more drive circuits with which the source driver of the above-mentioned driver section is equipped. Therefore, according to this invention, the complexity of the circumference circuit in the case of indicating two or more images by coincidence can be canceled, and an image display device with the structure which does not need a special conversion circuit, memory, etc. can be realized.

[0012] As shown in drawing 1, using the so-called driver monolithic panel which forms a drive circuit in one, the source circuit where the screen-display section became independent respectively up and down can be prepared, and, specifically, screen separation can be easily performed by driving independently. It is also possible for this not to necessarily be limited to the thing of a screen for which a driver is allotted up and down, to divide a part of driver in one source line, and to make it another input.

[0013] Moreover, at least one of the driver circuits consists of digital circuits as a display corresponding to digitization in recent years. By this, the display of two or more signals is attained at the coincidence corresponding to digital inputs, such as graphic display corresponding to the conventional analog signal, a teletext, and the Internet. Furthermore, when it constitutes the character representation section to the field specified beforehand, it also becomes possible to change and carry out autonomous working of the resolution of a fixed area. Thus, it becomes possible by using a driver monolithic circuit to carry independently two or more circuits which can be driven on the same substrate.

[0014] Moreover, invention of claim 2 is characterized by arranging the source driver of the above-mentioned driver section along the surface and the lower side which have extended in the direction of X of the above-mentioned image display section in the liquid crystal display according to claim 1.

[0015] In invention of this claim 2, since the drive circuit of a source driver where

the image display section became independent respectively up and down is arranged, screen separation can be easily performed by driving independently two or more of these drive circuits, respectively.

[0016] Moreover, invention of claim 3 is characterized by at least one of the drivers with which the above-mentioned driver section is equipped consisting of digital drivers in the liquid crystal display according to claim 1 or 2.

[0017] In invention of this claim 3, graphic display corresponding to the conventional analog signal and coincidence two or more image display corresponding to digital inputs, such as a teletext and the Internet, can be performed by constituting at least one of the drivers from a digital circuit.

[0018] Moreover, invention of claim 4 is characterized by equipping the above-mentioned source driver with the circuit changing switch which it has the digital disposal circuit which writes an input signal in the above-mentioned image display section, and the above-mentioned gate driver chooses a predetermined driver signal from two or more driver signals, and is inputted into the above-mentioned image display section in claim 1 thru/or the liquid crystal display of any one publication of three.

[0019] In invention of this claim 4, a predetermined driver signal can be chosen from two or more driver signals with the above-mentioned circuit changing switch, it can input into the above-mentioned image display section, and two or more different input signals can be inputted into the image display section one by one from two or more drive circuits with which the above-mentioned source driver is equipped.

[0020] Moreover, the signal line for invention of claim 5 to write data in the above-mentioned image display section in a liquid crystal display according to claim 1 is characterized by being divided in the above-mentioned image display circles.

[0021] In invention of this claim 5, the resolution of two or more divided image display parts corresponding to the divided signal line can be separately set up according to an application.

[0022]

[Embodiment of the Invention] Hereafter, the liquid crystal display of this invention is explained to a detail based on the gestalt of implementation of illustration.

[0023] The circuitry of the gestalt of operation of the liquid crystal display of this invention is shown in drawing 1 . In the circuitry of the gestalt of this operation, in order to realize a driver monolithic circuit, the driver monolithic mold liquid crystal display which used polycrystalline silicon is realized. Polycrystalline silicon TFT (thin film transistor) has large drive capacity, and fits the circuit driven at high speed. Moreover, the panel of a high definition can also be produced and it is the optimal as an application of this invention. The indicating equipment set as the application object of this invention is a 8 to 40 inches large display module, and the indicating equipment of the medium size of a 8 inch class can mainly constitute it as an accepting-reality panel. Moreover, the display of a projection mold may be used about a panel 20 inches or more.

[0024] This liquid crystal display is equipped with the image display section 1, the gate driver 3 arranged so that it may extend in the direction of Y, and one pair of source drivers 40 and 50 arranged so that it may extend in the direction of X. This source driver 40 is arranged along with the surface of the image display section 1, and consists of a shift register 41 and a digital disposal circuit 42. Moreover, the source driver 50 is arranged along the lower side of the image display section 1, and consists of a shift register 51 and a digital disposal circuit 52. These shift registers 41 and 51 send an input signal to a pixel one by one. Moreover, digital disposal circuits 42 and 52 consist of a buffer and a sample hold circuit.

[0025] The above-mentioned image display section 1 is equipped with two or more pixels 2 and TFT 2 and 2 -- which were arranged in the direction of X-Y, and the gate of each pixel TFT2 is connected to the above-mentioned gate driver 3. Moreover, the source of each pixel TFT2 is connected to the above-mentioned source drivers 40 and 50.

[0026] As shown in drawing 2 , after it is inputted into the analog signal processing circuit 210 as a video-processing circuit, and the analog video signal 200 represented by the television signal gets over and is amplified in this analog signal processing circuit 210, it is inputted into the source driver 40 as a RGB status signal. Moreover, this analog signal processing circuit 210 inputs the gate driver driving signal 220 into a gate driver 3 synchronizing with the above-mentioned RGB status signal.

[0027] The digital signal 201 which the information signal treated with a personal computer etc. represents on the other hand is inputted into the source driver 50 as a data signal through the digital digital disposal circuit 211. Since the source driver 50 consists of digital circuits and is, it can be made to display on the image display section 1 by making the above-mentioned digital signal 201 into a video signal as it is here.

[0028] With the gestalt of this operation, the drivers 3, 40, and 50 which make the image display section 1 and the driver section have driver monolithic structure currently formed in one on the insulating substrate (not shown). And two independent input signals (for example, digital input signal by the video signal, text, and the Internet etc.), the analog video signal 200 and the digital video signal 201, can be inputted into two processing circuits 42 and 52 with which the above-mentioned source drivers 40 and 50 are equipped. Therefore, according to this operation gestalt, the complexity of the circumference circuit in the case of indicating two or more images by coincidence can be canceled, and an image display device with the structure which does not need a special conversion circuit, memory, etc. can be realized.

[0029] Moreover, with the gestalt of this operation, since the source drivers 40 and 50 which the image display section 1 became independent of respectively up and down are arranged, screen separation can be easily carried out by driving independently these two independent source drivers 40 and 50, respectively.

[0030] By the way, in not deciding display area of the image display section 1 beforehand, a gate driver 3 operates so that the approach of inputting the analog

video signal 200 and a digital signal 201 into the image display section 1 one by one may be taken. By this approach, beforehand, the analog signal processing circuit 210 can compress a signal using the Rhine memory, can shorten write-in time amount, and can write a digital signal 201 in the image display section 1 using the time amount of a blanking.

[0031] Moreover, when it is decided beforehand to divide the part into which a video signal 200 is inputted, and the part into which a digital signal 201 is inputted in the display area of the image display section 1, video-signal input partial 1A and digital signal input partial 1B can be driven independently by the source drivers 40 and 50. As furthermore shown in drawing 2 in this case, source line 233,233 -- is made to Rhine 233A by the side of video-signal input partial 1A, 233A--, and the configuration divided into Rhine 233B by the side of digital signal input partial 1B, and 233B--. In this case, resolving power and a pixel pitch are replaceable in the input parts 1A and 1B. That is, in the character representation section (for example, input partial 1B) which needs high resolution, the number of pixels can be increased compared with the graphic display section (input partial 1A). This is easily realizable in a driver monolithic mold panel like this operation gestalt.

[0032] Next, as a modification of the above-mentioned operation gestalt, the display screen is quadrisected into Screen 300,301,302,303 and an example on which these four screens are driven independently and displayed is shown. In this modification, with the combination of a gate driver 310,311,312,313 and the source driver 340,341,342,343, each display screen 300,301,302,303 can be scanned independently and can be displayed. This source driver 340,341,342,343 consists of shift registers 340a, 341a, 342a, and 343a and digital disposal circuits 340b, 341b, 342b, and 343b, respectively.

[0033] The above-mentioned gate drivers 310 and 311 have countered in the direction of X, and gate drivers 312 and 313 have countered in the direction of X. Moreover, gate drivers 310 and 312 are located in a line in the direction of Y, and gate drivers 311 and 313 are located in a line in the direction of Y. On the other

hand, the source driver 340 and the source driver 341 are located in a line in the direction of X, and the source drivers 342 and 343 are located in a line in the direction of X.

[0034] In this modification, a display screen 300 displays by being scanned with the source driver 340 and a gate driver 310. Moreover, a display screen 301 displays by being scanned with the source driver 341 and a gate driver 311. Moreover, a display screen 302 is scanned with the source driver 342 and a gate driver 312, is displayed, and a display screen 303 is scanned with the source driver 343 and a gate driver 313, and it displays it.

[0035] Like this modification, when dividing and carrying out the independent scan of the screen, taking advantage of the advantage which is a driver monolithic, an alphabetic character can be vividly displayed by making the character representation screen 302 into high resolution rather than the image information-display screen 300. Without the driver connection especially doubled with the pixel pitch becoming possible on a glass substrate, and receiving the limit on mounting, two or more screens where resolution differs are driven independently, and can be displayed.

[0036] In addition, although the source driver has been arranged along the surface and the lower side of a screen with the gestalt of the above-mentioned implementation, it is also possible to divide a part of source driver in one source line, and to input the signal of another network.

[0037]

[Effect of the Invention] As mentioned above, the image display section and the driver section are the driver monolithic structures currently formed in one on the insulating substrate, and the liquid crystal display of invention of claim 1 can input two or more independent input signals (digital input signal by the video signal, text, and the Internet etc.) into two or more drive circuits with which the source driver of the above-mentioned driver section is equipped so that clearly.

Therefore, according to this invention, the complexity of the circumference circuit in the case of indicating two or more images by coincidence can be canceled,

and an image display device with the structure which does not need a special conversion circuit, memory, etc. can be realized.

[0038] Moreover, since the drive circuit of a source driver where the image display section became independent respectively up and down is arranged, invention of claim 2 can perform screen separation easily by driving independently two or more of these drive circuits, respectively.

[0039] Moreover, invention of claim 3 can perform graphic display corresponding to the conventional analog signal, and coincidence two or more image display corresponding to digital inputs, such as a teletext and the Internet, in a liquid crystal display according to claim 1 or 2 by constituting at least one of the drivers from a digital circuit.

[0040] Moreover, in claim 1 thru/or the liquid crystal display of any one publication of three, invention of claim 4 had the digital disposal circuit which writes an input signal in the above-mentioned image display section, and the above-mentioned source driver is equipped [invention] with the circuit changing switch which chooses a driver signal predetermined from two or more driver signals, and inputs it into the above-mentioned image display section by the above-mentioned gate driver.

[0041] In invention of this claim 4, a predetermined driver signal can be chosen from two or more driver signals with the above-mentioned circuit changing switch, it can input into the above-mentioned image display section, and two or more different input signals can be inputted into the image display section one by one from two or more drive circuits with which the above-mentioned source driver is equipped.

[0042] Moreover, the signal line for invention of claim 5 to write data in the image display section in a liquid crystal display according to claim 1 is divided in image display circles. In this invention, the resolution of two or more divided image display parts corresponding to the divided signal line can be separately set up according to an application.

[0043] As mentioned above, by using this invention, it becomes possible to

juxtaposition, since it can input into a display, without carrying out D/A conversion about an input signal A/D conversion or to carry out a signal input, and simplification of a circumference circuit can be attained. Moreover, it is realizable by using the driver monolithic panel of this invention without the burden of mounting of the display from which screen separation and resolution differ.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing each driver arranged on the image display section of the operation gestalt of the liquid crystal display of this invention, and the outskirts of it.

[Drawing 2] It is drawing showing the flow of the input signal in the above-mentioned operation gestalt.

[Drawing 3] It is the block diagram showing the modification of the above-mentioned operation gestalt.

[Description of Notations]

1 [-- Source driver / 41 51 / 200 / -- A gate driver driving signal, 201 / -- A digital signal, 211 / -- A digital digital disposal circuit, 233 / -- A source line,

300,301,302,303 / -- A screen, 310,311,312,313 / -- A gate driver,
340,341,342,343 / -- Source driver. / -- An analog video signal, 210 -- An analog
signal processing circuit, 220 / -- 42 A shift register 52 -- Digital disposal circuit] -
- The liquid crystal display section, 2 -- Pixel TFT, 3 -- 40 A gate driver, 50

[Translation done.]

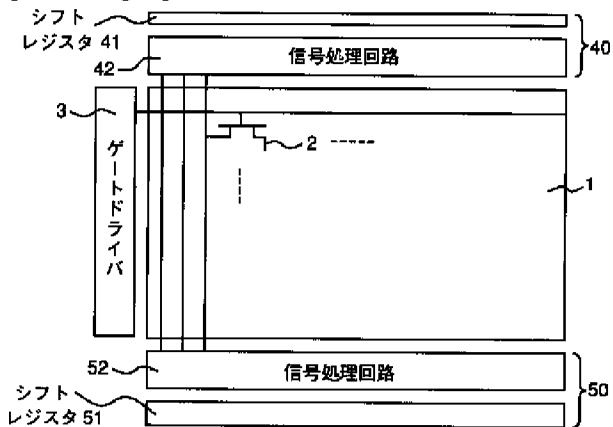
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DRAWINGS

[Drawing 1]



[Drawing 2]

